

Questionable Concepts in Neotraditional Subdivision Design

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ABSTRACT

An ITE Recommended Practice “Traditional Neighborhood Development Street Design Guidelines” has been published. Eleven “principles” represent valid concepts, while nine are questionable (such as elimination of functional classification; narrow, congested streets; encouraging on-street parking; and alley access garages). These issues are addressed and pedestrian accident data are given.

INTRODUCTION

The push for “recognition” of Traditional Neighborhood Development (TND) has been going on for a number of years. Ramsey/Sleeper has included a discussion of TND in *Architectural Graphics Standards (1)*. The Institute of Transportation Engineers Planning Council Committee 5P-8 developed a proposed Recommended Practice in 1997 (2). This has been revised as a “final” document dated June 1998.

Recently, the ITE has published numerous articles on traffic “calming.” This illogical and inappropriate term seems to have crept into the literature, even though obviously the subject has to do instead with socially responsible operation of motor vehicles—especially in residential neighborhoods. Whatever the name, the intent seems to be the lowering of vehicular traffic speed in subdivisions. TND has endorsed this philosophy—apparently without asking whether reduced speed automatically equates to improved safety. An appropriate question might be whether use of narrow, congested streets with parking on both sides, which does reduce operating speed, actually results in greater or lesser hazard.

The purpose of this paper is to review some of the chief tenets of TND and compare these with accepted practice and findings from accident and other traffic studies.

Professional and Personal Qualifications of the Reviewer

My work has included geometric design of subdivision streets, sidewalks and lighting as a municipal engineer, including extensive accident analysis, plus review of traffic elements of proposed subdivisions as a consultant to municipalities. I chaired Committee 6E in 1962/63 and wrote most of the text of the Guidelines for Subdivision Streets, approved as a Recommended Practice of the ITE in 1965 (3). This was followed by chairing the update committee for Guidelines for Subdivision Streets, also a Recommended Practice, published in 1984 (4), plus the updated Guidelines for Residential Subdivision Street Design, approved as an ITE Recommended Practice in 1993 (5).

In order to critique some of the TND concepts, it is useful to have directly experienced similar living conditions. In my case, I have lived on residential streets ranging from 26 to 34 feet wide, with rights-of-way from 40 to 66 feet, with alleys and alley garages, with front driveways and 2-car garages, with apartments in the same block, with local neighborhood shops a block away, in exclusively single-family neighborhoods and in duplexes. Most locations had sidewalks set back from the street, but one had curb walks. Most, but not all blocks, had street lights. Lot widths ranged from 25 to 109 feet.

Hopefully, this range of work and living experience encompasses most of the conditions relative to local street development under both TND and conventional subdivision concepts.

Agreements and Disagreements with TND Issues

Many TND concepts are in accordance with what I have found to be good practice, such as:

- Transit access.
- Sidewalks on every street.
- Good, interconnected pedestrian system.
- Alleys in apartment and commercial areas.
- Street lighting.
- Street trees.
- Neighborhood shops within walking distance, where practical.
- Mixes of residential density.
- Apartments above stores.
- Avoidance of dead-end streets.
- Gridiron street pattern (with some through traffic limited by appropriate discontinuities and some curvilinear alignment to limit speeds and enhance the street vista).

A smaller but important number of disagreements with TND themes are:

- Lack of functional classification related to design.
- Promoting on-street parking as a safety element.
- Sidewalks next to curbs.
- Narrow, congested streets.
- 20-mph design speed.
- Low-mounted street lights.
- Small intersection corner radii.
- Alley-oriented garages for single family homes, without setback.
- Bicycle traffic significance.

I believe there are valid reasons for each of the disagreements. These are discussed in the following sections.

Functional Classification

The proposed TND guidelines reject separate definitions of Local streets and Collectors. However, the existing ITE design criteria for Residential Subdivision Streets clearly identify a fundamental difference between these two types of streets (5). The American Association of State Highway and Transportation Officials also recognizes a difference (6). The American Society of Civil Engineers in their *Residential Streets* booklet even adds another category of Subcollector (7).

Functional classification forms the basis of traffic planning, as well as of design. It allows a logical separation of street design elements for Collectors, such as higher operating speed, greater width, priority (by posting intersecting cross streets with Yield or Stop sign control), transit routing, and connection of Local streets to the nearest Major streets.

Typically, Local street daily volumes range from 100 to 1,500 vehicles per day, and Collectors 1,500 to 3,500 in residential areas. The TND Guidelines list six street "Types" with volumes ranging up to 15,000 vehicles per day. In fact, one-half the Types are of the Major category and would hardly represent good living conditions for the average citizen who seeks to avoid a motorist-dominated environment.

On-Street Parking

The literature is replete with adverse findings relative to curb parking from both the safety and congestion standpoint. Many of these studies are summarized in the FHWA report "Safety Aspects of Curb Parking" (8). Table 1 gives some of the data from the 10-city/5-state accident studies.

The Parking chapter in Highway Research Board *Special Report 93* identified a study of 1,200 blocks in one city that found parked cars to cause 12% of all accidents on Major streets and 43% on minor streets (Local and Collector), with an overall figure of 18% (9). In densely developed apartment and business areas, accident rates were found to

**TABLE 1 Curb Parking Accident Proportions
by Severity and Functional Classification**

Classification	Accident Proportion		
	PDO	Injury	Total
Local	54%	30%	49%
Collector	57%	25%	50%
Major	19%	5%	15%
Total	24%	7%	20%

SOURCE: Table 9, Ref. 8, from a study of 2,057 accidents in Miami, Coral Gables, Clearwater, and Abilene.

be nearly three times greater than on single-family residential streets. Considering only *midblock* type accidents, curb parking was found to account for two-thirds of the total. A statistical summary from the City of Chicago identified 23% of all non-freeway accidents to involve curb parking (10). A 5-year study of midblock accidents in a Chicago suburb found 31% of the Major street accidents and 66% of the Local and Collector street accidents to involve curb parking (11).

The types of accidents that curb parking creates include parking maneuver activity, opening vehicle doors, blocking driver view of oncoming traffic for drivers exiting from intersections and driveways, striking of parked cars, and pedestrians struck while emerging from behind parked vehicles. The study by Snyder of 2,100 pedestrian accidents found 24% to involve “dart-out” accidents where curb parked vehicles were a factor (12).

While an entire article can be written on the evils of curb parking—and many have—there seems little question but that curb parking should be minimized. It can and should be totally prohibited along most Major streets. On residential Local and Collector streets, some must be tolerated because each residence cannot have a self-contained parking lot to accommodate overflow vehicles such as those of guests. However, by providing convenient, accessible and adequate off-street parking such as 2-car garages for single-family homes, in a setback area of at least 20 feet, the amount of on-street parking will be minimized and safety enhanced.

Sidewalks Next to Curbs

Claims that parked cars could act as a pedestrian buffer and allow sidewalks to be located next to the curb, as blandly stated in a recent paper (13), warrant careful scrutiny. In six of the eight photos given in the TND Recommended Practice, sidewalks are illustrated next to the curb, although the report does say that a 6-foot planting strip will further buffer pedestrians from traffic. However, the report then goes on to caution against larger strips. The ITE Subdivision Guidelines recommend 5- to 6-foot buffers for Local streets and 10 feet for Collectors (5). Such a strip is stated by the ITE to offer the following advantages:

1. Children walking and playing side by side have increased safety from street traffic.
2. Conflict between the pedestrians and garbage or trash cans awaiting pick-up at the curb is eliminated by using the border area for such temporary storage.
3. The warped area necessary for a proper driveway gradient is minimized by having a major portion of this gradient fall within the border area.
4. Danger of collision by run-off-road vehicles is decreased by placement of the walk at maximum practical distance from the curb with further separation by tree plantings.
5. Conflict with storage of snow plowed off the roadway is minimized.
6. Pedestrians are less likely to be “splashed” by passing vehicles.

Narrow, Congested Streets

Several studies have been conducted relating Local street width to accident hazard. One of the earliest studies was conducted as part of development of the ITE Recommended Practices for Subdivision Streets in the 60s. Accidents occurring along Local and Collector

streets of single-family residential areas were tabulated for widths from under 23 feet up to 40 feet (14). The injury and property damage accidents were tabulated for a 2-year period on a per-mile frequency. Where adequate sample sizes were found, the accident rate per mile for streets 25 feet and under was 3.1. The safest width of 32 feet was identified, with an accident rate of 1.7 per mile. With the 34-foot width, the rate increased to 2.6. While densities of curb parking were not directly controlled, it was concluded that increasing width beyond a certain point did not automatically generate improved safety.

A separate study was made of Local and Collector streets serving multiple-family residential development. Again, the 32-foot street width showed a slightly lower accident rate per mile than did the 34-foot width.

Another study of Local street width related to accident frequency per mile was conducted in Deerfield, Illinois (15). About 15 miles of local streets under 25 feet in width were compared with 25 miles having widths of over 25 feet. The accident rate on the narrower streets was about 50% higher than for the wider streets. The frequency of pedestrian or bicycle accidents was three times as great per mile on the narrower streets.

The FHWA study (8) also looked at street width as related to accidents and curb parking density. Table 2 summarizes some results.

Table 2 clearly shows the increase in accident frequency with increased curb parking use. Widths greater than the basic ones recommended by the ITE usually generate higher accident frequencies.

A recent study by Gattis and Watts looked at speed and accidents versus width and functional classification of several Fayetteville, Arkansas streets (16). The examination cast doubt on statements that narrower Major streets automatically result in lower speeds. Even though one street was 50% wider than the other, a P85 speed difference of only 1% was found. Furthermore, the accident rate per vehicle mile on the narrower street was over twice that of the wider street. Looking at Local streets, a slight P85 lower speed differential was found for narrower streets of 1.0-mph between a 20- and a 26-foot width, and of 1.8- to 2.8-mph between a 26- and a 30-foot width.

While one might expect slightly lower speeds on narrow, congested streets, it is difficult to project improved safety from this. Available data suggest the exact opposite.

TABLE 2 Local Street Accident Frequency Related to Parking Density and Street Width

Percent of Curb Spaces Occupied*	<u>Annual Accident Frequency per Mile</u>		
	All Widths	27-28 Ft.**	33-36 Ft.
0- 10	1.3	1.1	2.3
11- 30	2.2	1.7	2.5
31- 50	4.4	6.3	2.5
51-100	9.3	8.7	9.1

SOURCE: Table 28, Ref. 8.

*24-hour average.

**ITE Subdivision Design Guidelines typical for single family.

Reasonable safety can be achieved by providing street widths such as those recommended for the low, medium or high density development in level, rolling or hilly terrain as given in Table 1 of the ITE Subdivision Street Design (5). This range of 20 to 36 feet is intended to cover all of the conditions customarily found in subdivisions as affected by both density and terrain. Such a distinction was not found in the proposed TND Guidelines. Instead, the reader is advised that “a street should be no wider than the minimum width needed to accommodate the usual vehicular mix that the street will serve.” A range of 10 to 60 or more feet is given. This statement is followed by “If the principles of design and the balance of these guidelines are read and properly applied, appropriate dimensions will follow as a normal part of a design process for the street under construction.”

This statement certainly applies to the existing ITE Street Design Guidelines, where more guidance is given to the designer than under the TND principles.

20-mph Design Speed

The TND authors claim 20-mph speeds are “typical” of residential streets. The Uniform Vehicle Code recommends that the basic urban speed limit be 30-mph. A 1994 survey by the National Motorists Association found 14 states complying, 24 specifying 25-mph, 5 establishing 35-mph, and 7 undetermined. Studies in Tucson, Arizona, of Local streets found 85th percentile speeds to range from 25.5- to 33.5-mph, for an average of 30.9-mph—a clear verification of both the Uniform Vehicle Code and the ITE Guidelines, which also recommend 30-mph as a basic. Gattis and Watts found 26- to 28-mph as the P85 on four of the five Local streets they studied and 33-mph on a Collector (16). I have used pacing to check speeds on numerous local residential streets in cities across the country. Regardless of state law (and occasionally posted limits), motorist speeds of about 30-mph on straight, level Local residential subdivision streets have been found to be typical.

The 1993 ITE Recommended Practice Guidelines for local street widths vary by type of terrain and density, and design speeds drop from 30- to 20-mph with increasingly hilly terrain (5). This is a rational approach.

Low-Mounted Street Lights

The TND guidelines suggest a general rule for lighting a project is more, smaller lights, as opposed to fewer high intensity lights. They suggest mounting heights of 8 to 12 feet and “full spectrum of light so that colors at night are realistic.” However, such low mounting heights result in inefficiency, added capital, energy and maintenance costs, proneness to vandalism, and possible added glare. A traditional and appropriate mounting height is 25 feet with pole spacings of about 220 feet in midblock areas, moderately long brackets and Type II distribution luminaires (17). Such an effective and economical street lighting layout is fully practical for residential areas.

If one wishes full-spectrum lighting, this eliminates the very efficient high pressure sodium. While it is unthinkable to use the extremely inefficient incandescent lamp, the color-corrected Mercury and metal halide types will do a reasonable job of providing color rendition. Furthermore, “high intensity” lights are not needed to provide

the nationally recommended average value of 0.4 horizontal footcandles along a Local residential street (17).

Small Intersection Corner Radii

The proposed TND guidelines contain two tables—#6 with a 5-foot sidewalk next to the curb, and #7 with 6- to 10-foot wide sidewalks located six feet back from the curb. They calculate the various added crossing distances, presumably beginning with zero radius. The existing ITE Guidelines for Residential Subdivision Street Design call for setbacks of 5 to 6 feet between the street edge of sidewalk and curb face. Changing from a 10-foot radius to the 20-foot radius recommended by the ITE for Local-Local type intersections, with a curb walk, increases crossing distance about 14 feet. However if the 5-foot walk is set back 6 feet, then the difference between the 10- and 20-foot radius is only 7 feet, or about two seconds added walking distance in the street.

It is unlikely that any definitive study will ever establish whether there is any significant difference in the actual hazard produced by such a difference in radii. This issue is therefore likely to remain a judgment call. However, added crossing distance at intersections clearly represents another argument against the use of sidewalks next to the curb. Furthermore, pedestrian accidents at intersections of local streets are fortunately quite rare. In one 5-year study of nearly 13,000 accidents, only 0.3% of total city accidents were found to involve pedestrians or bicyclists at intersections of Local or Collector streets (11). Over three-fourths of such accidents on these streets occurred in midblock locations. These and other data are given in Table 3.

TABLE 3 Five-Year Pedestrian Accident Experience

Location	Pedestrian*	Other Acc.	Ped. Proportion of		
			Group	All Acc.	
LOCAL & COLLECTOR STREETS					
Intersection	33	985	3.2%	0.3%	
Midblock	102	1419	6.7%	0.8%	
Subtotal	135	2404	5.3%	1.1%	
MAJOR STREETS					
Intersection	168	6274	2.6%	1.3%	
Midblock	78	3431	1.4%	0.6%	
Subtotal	246	9705	2.4%	2.0%	
ALL ACCIDENTS					
Intersection	201	7259	2.7%	1.6%	
Midblock	180	4850	3.6%	1.4%	
Alleys	14	99	12.4%	0.1%	
Railroad Crossings	3	23	11.5%	0.0%	
TOTAL	398	12,231	3.2%	3.2%	

SOURCE: Ref. 11.

*Including bicycle.

Over 60% of all pedestrian or bicycle accidents involved the Major street system. Also note the number of pedestrian and bicycle accidents in alleys was almost one-half the number that occurred at the Local or Collector street intersections.

These data suggest that pedestrian accidents at Local/Local street intersections (only one-third of 1% of all accidents in this study) are such a small proportion of the overall safety picture that concerning ourselves with a couple of seconds walking time and its unresearched effect on accidents is not justified. In fact, very small radii such as those less than 15 feet may invite corner curb override and increased hazard to pedestrians waiting to cross.

Alley-Oriented Garages and Setbacks

There are several disadvantages of garages connected to alleys as compared with being attached to the front of a single-family home. First and foremost is the question of personal security. Second is the inconvenience and exposure to inclement weather that is normally associated with alley-oriented garages. In some cases, enclosed “breezeways” have been constructed connecting the home to the garage, but this disrupts the rear yard area. In single-family areas, alleys have the added disadvantage of taking up space that could otherwise be devoted to the homeowner’s yard. It is pointed out in the current ITE Guidelines (5) that densities of 5.5 to 6 dwelling units per acre and 10% side yards reduce buildable widths of lots to 30 to 34 feet. A mandatory provision for front driveways, therefore, could impose severe architectural limitations. These Guidelines point out that alleys then might be a preferable alternative for the local agency to consider. The Practice also goes on to point out that in higher density and conventional apartment developments, alleys could provide access to rear lot parking spaces, becoming in effect a common driveway. The alley also affords secondary access for fire equipment, service trucks and maintenance access to rear-line overhead utilities.

The ITE Practice states “the modern alley can be an asset if provided with proper pavement and right-of-way width of approximately 20 feet, adequate radii at street intersections of 15 to 20 feet, an all-weather paved surface and protected by building and parking bay setback limits of at least five feet.” Disadvantages were also cited, such as the additional pavement to be constructed and maintained, the area removed from the tax rolls, and the added length of police patrol and street lighting needs. The existing Practice concludes by stating that “the pressure for more open space and the increasing usage of common greens, plus an attempt at pedestrian-vehicular separation in residential areas, all suggest that even well-constructed and maintained alleys may play only a limited role in future residential construction.”

Many of us would feel that the existing ITE Practice adequately covers the advantages and disadvantages of alleys, so that agencies are guided in making their decision as to their own local needs.

The TND Guidelines recommend no building setback line from alleys. However, this would create a hazardous sight obstruction for drivers backing out of garages and, depending upon the alley width, would likely be inadequate for access by full-size passenger vehicles.

Bicycle Traffic Significance

The TND Guidelines cite a survey reporting that 46% of adults over age 17 had ridden bicycles within the prior year. They then say that bicycles are an “increasingly important form of non-motorist travel” and are a “serious transportation machine.” In fact, while bicycle sales may have gone up, much of this is for recreational use. For most typical applications and climates, the bicycle is a distinctly inferior form of transportation to and from work, shopping or most other trip purposes.

A Federal survey found, comparing 1990 with 1995 (18), that travel by bicycle increased, but to less than 1% of the total. Moreover, only 20% of the pedestrian and bicycle trips were journeys to work. In April 1999, peak hour vehicular and bicycle traffic counts were made at five Major/Major intersections in Mesa, AZ (19). Bicycles represented only 0.1 to 0.2% of the total entering vehicles and thus directly confirmed the Federal findings. The Mesa climate is extremely conducive to bike use, has many streets with bicycle lanes, and has a very level terrain. The findings from this study also show that commuter bicycle use is not a significant transportation element.

SUMMARY

Nine tenets of TND principles have been shown to be questionable at best, and, in some cases, potentially hazardous. In a recent conversation, one of the nation’s strongest proponents of TND was unable to identify a single example in the United States of a community fully designed around TND principles. However, thousands of conventional subdivisions exist that illustrate application of all of the ITE Residential Subdivision Street Design Guidelines. Many of these have been studied and the results used to temper the Guidelines across three Recommended Practices. Adoption of certain untested TND principles—no matter how laudable in theory—is very questionable and potentially confusing. To address this conflict, the ITE has a current committee charged with melding the existing Recommended Practice for Residential Subdivision Street Design with the applicable elements of TND.

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